

APPROVED	C. . FIG.	
BY	CLASS	SUBCLASS
PARTSMAN		

SECRET

1	ATTTTATTATTACCAATCTTATATATAATATAATTTCTCTTACAAAAATCTCTAATG	60
61	TTTTATACCTAATATATATATCTGGCTTGATCTACTTTGCACCTCCACTATTTGTTAAT	120
121	TTATTTTCACTATTTTAGGTGTAATATGAATTGCAAAAAAATTTCTTATAACAACACTGCATT	180
	<u>M N C K K I L I T T A L</u>	
181	AAATATCATTAATGTACTCTATTTCCAAGCATAATCTTTTCTGATACTATACAAGATGGTAA	240
	<u>I S L M Y S I P S I S F S D T I Q D G N</u>	
241	CATGGGTGGTAACTTCTATATATTAGTGGAAAGTATGTACCAAGTGTCTCACATTTTGGTAG	300
	M G G N F Y I S G K Y V P S V S H F G S	
301	CTTCTCAGCTAAAGAAGAAAGCAAAATCAACTGTTGGAGTTTGTGGATTAAACAATGATTG	360
	F S A K E E S K S T V G V F G L K H D W	
361	GGATGGAAGTCCAATACTTAAGAATAAACACGCTGACTTTACTGTTCCAAACATATTCGTT	420
	D G S P I L K N K H A D F T V P N Y S F	
421	CAGATACGAGAACAATCCATTTCTAGGTTTGCAGGAGCTATCGGTACTCAATGGGTGG	480
	R Y E N N P F L G F A G A I G Y S M G G	
481	CCCAAGAAATAGAATTTCGAAATATCTTATGAAGCATTCGACGTAAAAAGTCCTAATATCAA	540
	P R I E F E I S Y E A F D V K S P N I N	
541	TTATCAAAATGACGCGCACAGGTACTGCGCTCTATCTCATCATCACATCGGCAGCCATGGA	600
	Y Q N D A H R Y C A L S H T S A A M E	
601	AGCTGATAAAATTTGCTTCTTAAAAAACGAAGGGTTAATTGACATATCACTTGCAATAAA	660
	A D K F V F L K N E G L I D I S L A I N	
661	TGCATGTTATGATATAATAAATGACAAAGTACCTGTTTCTCCTTATATATGCGCAGGTAT	720
	A C Y D I I N D K V P V S P Y I C A G I	

Fig. 1A

721 TGGTACTGATTGATTCTATGTTTGAAGCTACAAGTCCCTAAAATTTCCCTACCAAGGAAA 780  
G T D L I S M F E A T S P K I S Y Q G K

841 CAGGATCATAGGTAATGAGTTTAGAGATATTCCTGCAATAGTACCTAGTAACTCAACTAC 900  
R I I G N E F R D I P A I V P S N S T T

901 AATAAGTGGACCAATTTTGCAACAGTAACACTAAATGTGTGTCACTTTTGGTTTAGAACT 960  
I S G P Q F A T V T L N V C H F G L E L

961 TGGAGGAAGATTAACTTCTAAATTTTATGTGTGCCACATATTAATAATGATCTAAACTTG 1020  
G G R F N F (SEQ. ID NO: 2)

1021 TTTTAWTATTGCTACATACAAAAAAGAAAAATAGTGGCAAAAAGAAATGTAGCAATAAGA 1080  
1081 GGGGGGGGGACCAAAATTTATCTTCTATGCTTCCCAAGTTTTTCYCGCTATTTATGA 1140  
1141 CTTAAACAAACAGAGGTAATATCCTCAGGAAAACTTATCTTCAAAATATTTTATTTA 1200  
1201 CCAATCTTATATAATATAATTAATTTCTCTTACAAAAATCACTAGTATTTTATACCAAAA 1260  
1261 TATATATTCTGACTTGCTTTTCTTCTGCACTTCTACTATTTTAAATTTATTTGTCACTAT 1320  
1321 TAGGTTATAATAAAWATGAATTGCMAAAGATTTTTCATAGCAAGTGCAATTGATATCACTAA 1380  
1381 TGTCTTTCTTACCTAGCGTATCTTTTCTGAATCAATACATGAAGATAATATAAATGGTA 1440  
1441 ACTTTTACATTAGTGCAAAAGTATATGCCAAGTGCCCTCACACTTTGGCGTATTTTCAGTTA 1500  
1501 AAGAAGAGAAAAACACAACAACTGGAGTTTTCGGATTAAACAAGATTGGGACGGAGCAA 1560  
1561 CACTAAAGGATGCAAGCWGCAGCCACACAWTAGACCCCAAGTACAATG 1607

(SEQ ID NO: 1)

Fig. 1B



[illegible]

VR4

**Fig. 3B**

U.S. DEPARTMENT OF AGRICULTURE

6-11-78

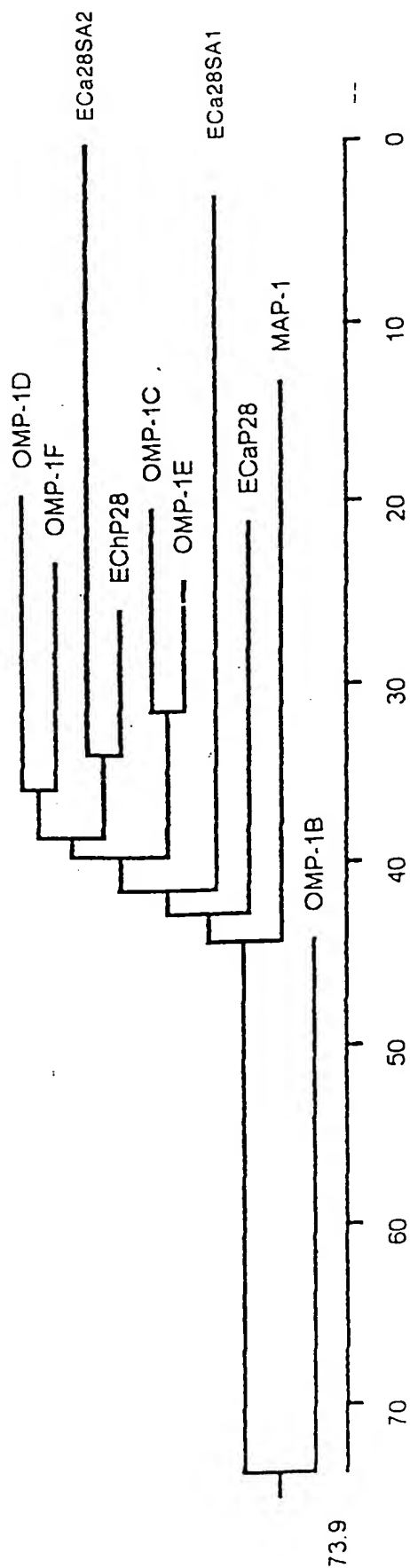


Fig. 4

CONFIDENTIAL

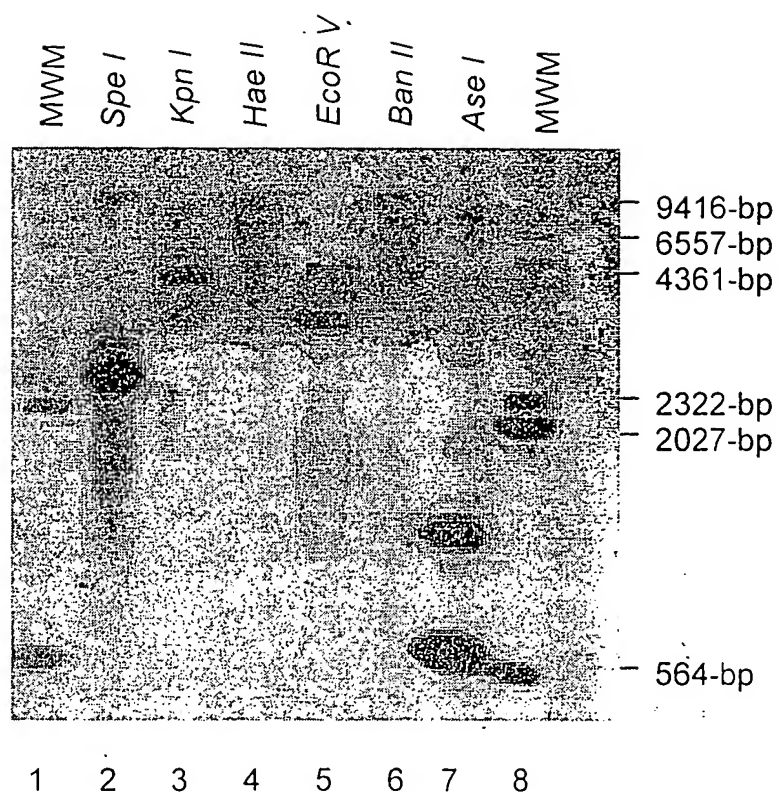
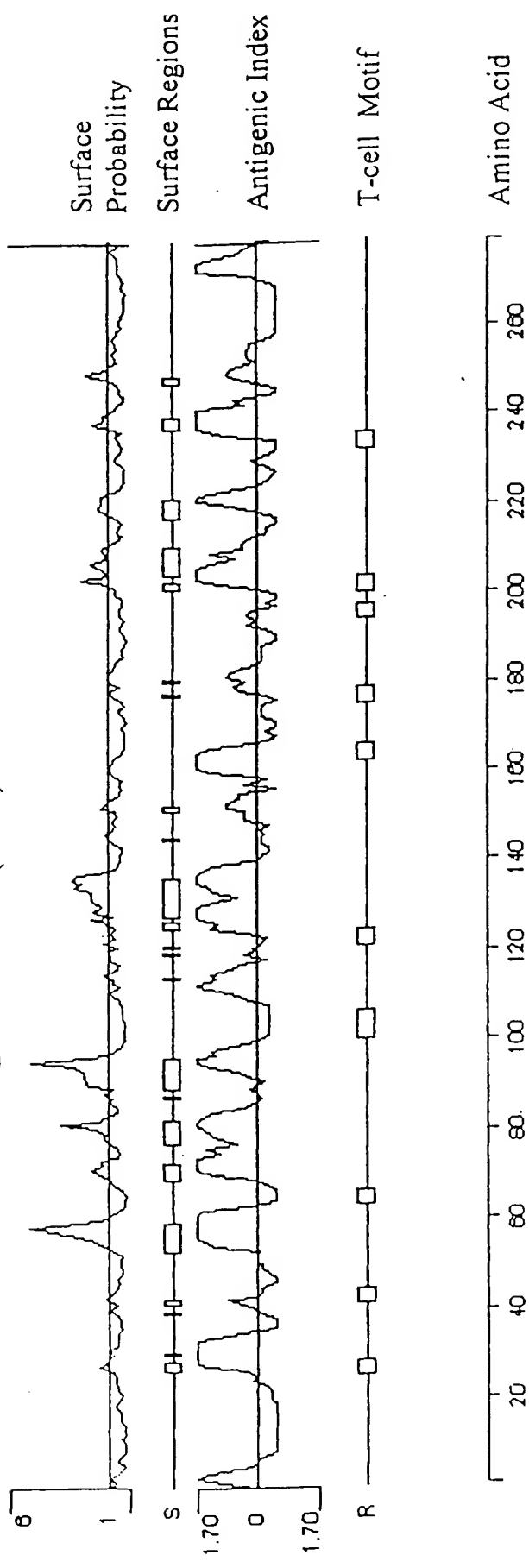


Fig. 5

*E. canis* P28 (Jake)



*E. chaffeensis* P28 (Arkansas)

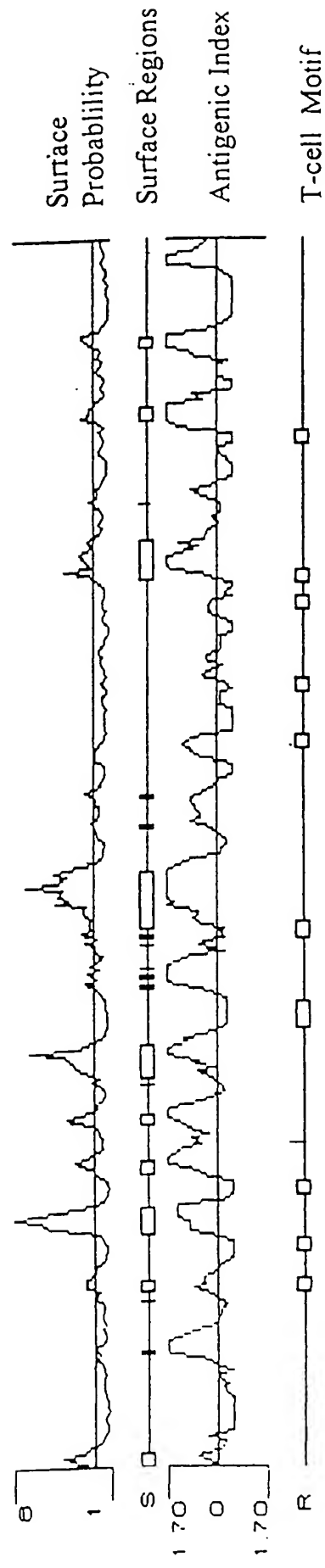


Fig. 6



APPROVED BY

FIG. 7A  
SUBCLASS

Eca28SA2

ATGAATTGTAAAAAGTTTTCACAAATAAGTGCAATGATATCATCCATATACTTCTACCT 60  
M N C K K V F T I S A L I S S I Y F L P  
AATGTCATACCTAACCAGTATATGGTAACAGTATGTATGGTAATTTTACATATCA 120  
N V S Y S N P V Y G N S M Y G N F Y I S  
GAAAGTACATGCCAAGTGTTCCTCATTTTGGAAATTTTTCAGCTGAAGAAGAGAAAAA 180  
G K Y M P S V P H F G I F S A E E K K  
AAGACAACTGTAGTATATGGCTTAAAGAAAACTGGCAGGAGATGCAATATCTAGTCAA 240  
K T T V V Y G L K E N W A G D A I S S Q  
AGTCCAGATGATAATTTTACCATTTCGAAATTTACTCATTTCAAGTATGCAAGCAACAAGTTT 300  
S P D D N F T I R N Y S F K Y A S N K F  
TTAGGGTTTGCAGTAGCTATTGGTTACTCGATAGGCAGTCCAAAGATAGAAAGTTGAGATG 360  
L G F A V A I G Y S I G S P R I E V E M  
TCTTATGAAGCATTTGATGTGAAAAATCCAGGTGATAATTACAAAAACGGTGCTTACAGG 420  
S Y E A F D V K N P G D N Y K N G A Y R  
TATTGTGCTTTATCTCATCAAGATGATCGGATGATGACATGACTAGTGCAACTGACAAA 480  
Y C A L S H Q D D A D D D M T S A T D K  
TTTGTATATTTAATGAAGGATTACTTAACATATCATTTATGACAAACATATGTAT 540  
F V Y L I N E G L L N I S F M T N I C Y  
GAAACAGCAAGCAAAAATATACCTCTCTCTCTTACATATGTGCAGGTATTGGTACTGAT 600  
E T A S K N I P L S P Y I C A G I G T D  
TTAATTCACATGTTTGAAACTACACATCCCTAAATTTCTTATCAAGGAAAGCTAGGGTTG 660  
L I H M F E T T H P K I S Y Q G K L G L

Fig. 7A

```

GCCTACTTCGTAAGTGCAGAGCTTTCGGTTCTTTTGGTATATATTTTCATAAAATTATA 720
A Y F V S A E S S V S F G I Y F H K I I

AATAATAAGTTTAAATAATGTTCCAGCCATGGTACCTATTAACTCAGACGAGATAGTAGGA 780
N N K F K N V P A M V P I N S D E I V G

CCACAGTTTGCAACAGTAACATTAAATGTATGCTACTTTGGATTAGAACTTGGATGTAGG 840
P Q F A T V T L N V C Y F G L E L G C R

TTCAACTTCTAAATTCGTGGTACACATATCACGAAGCTAAAAATTGTTTTTTTATCTCTGC 900
F N F * (SEQ ID NO: 4)

TGTATACAAGAGAAAAAATAGTAGTGAAAAATTACCTAAACAATATGACAGTACAAGTTTAC 960
CAAGCTTATTCACAAAAACTTCTTGCTCTTTTATCTCTTTTACAATGAAATGTACACTT 1020
AGCTTCACTACTGTAGAGTGTGTTTATCAATGCTTTGTTTATTAATACTCTACATAATAT 1080
GTTAAATTTTCTTACAAAACTCACTAGTAATTATATACTAGAAATATATTTCTGACTTGT 1140
                               (SEQ ID NO: 31)

Eca28SA3
ATTGTGCTTTATACTTCCACTATTGTTAATTTATTTTCACTATTTTAGGTGTAATATGAAT 1200
M N

TGCAAAAAAATTCCTTATAACAACACTGCATTAATGTCAATTAATGTACTATGTCTCCAAGCATA 1260
C K K I L I T T A L M S L M Y Y A P S I

TCCTTTTCTGATACATATAACAAGACGATAACACTGGTAGCTTCTACATCAGTGGAAAAATAT 1320
S F S D T I Q D D N T G S F Y I S G K Y

GTACCAAGTGTTCACATTTTGGTGTGTTTCTCAGCTAAAGAAGAAAGAACTCAACTGTT 1380
V P S V S H F G V F S A K E E R N S T V

GGAGTTTGTGGATTAAACATGATTGGAATGGAGGTACAAATATCTAACTCTTCTCCAGAA 1440
G V F G L K H D W N G G T I S N S S P E

```

Fig. 7B

AATATATTCACAGTTCAAAATATTATTCGTTTAAATACGAAACAACCCATTCTTAGGTTT 1500  
 N I F T V Q N Y S F K Y E N N P F L G F  
 GCAGGAGCTATTGGTTATTCAAATGGGTGGCCCAAGAAATAGAACTTGAAGTTCTGTACGAG 1560  
 A G A I G Y S M G G P R I E L E V L Y E  
 ACATTTCGATGTGAAAAATCAGAACAAATAATTATAAGAACGGCGCACACAGATACTGTGCT 1620  
 T F D V K N Q N N N Y K N G A H R Y C A  
 TTATCTCATCATAGTTCAGCAACAAGCATGTCCTCCGCAAGTAACAAATTTGTTTTCTTA 1680  
 L S H S S A T S M S S A S N K F V F L  
 AAAAATGAAGGGTTAATTGACTTATCATTTATGATAAATGCATGCTATGACATAATAATT 1740  
 K N E G L I D L S F M I N A C Y D I I I  
 GAAGGAATGCCTTTTTCACCTTATATTGTCAGAGTGTTGGTACTGATGTTGTTTCCATG 1800  
 E G M P F S P Y I C A G V G T D V V S M  
 TTTGAAGCTATAAAATCCTAAAAATTTCTTACCAAGGAAACACTAGGATTAGTTATAGTATA 1860  
 F E A I N P K I S Y Q G K L G L G Y S I  
 AGTTCAGAAGCCTCTGTTTTTATCGGTGGACACTTTCACAGAGTCATAGGTAATGAATTT 1920  
 S S E A S V F I G G H F H R V I G N E F  
 AGAGACATCCCTGCTATGGTTCCTAGTGGATCAAAATCTTCCAGAAAACCAATTTGCAATA 1980  
 R D I P A M V P S G S N L P E N Q F A I  
 GTAACACTAAATGTGTGTCACCTTTGGCATAGAACTTGGAGGAAGATTAACTTCTGA 2031  
 V T L N V C H F G I E L G G R F N F \*  
 (SEQ ID NO: 5)  
 (SEQ ID NO: 6)

Fig. 7C

ECa28SA1, ECa28SA2, ECa28SA3, ECa28-1, ECa28-2

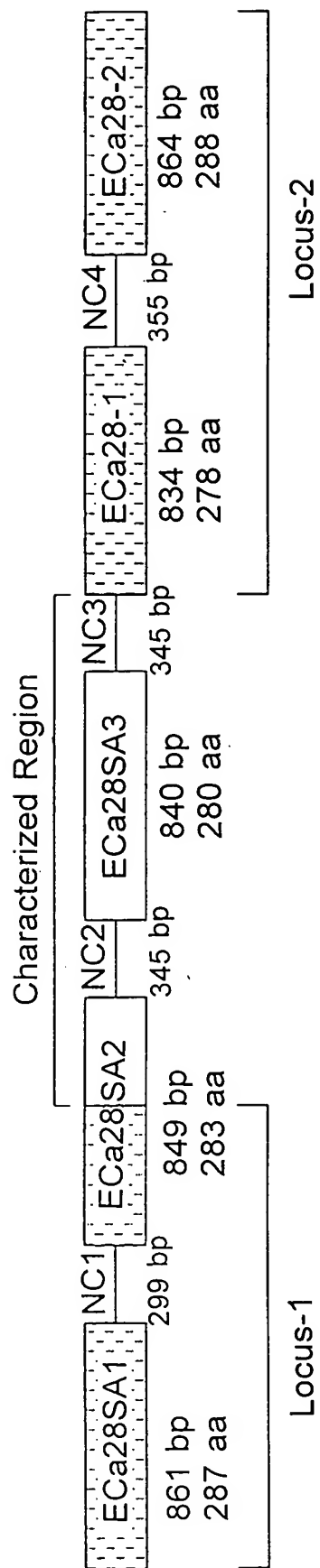
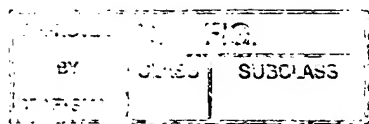


Fig. 8

**Fig. 9**



1	TAATACTTCTATTGT-ACATGTTAAATAATAGTACTAGTTTCTGTGTT--TATAAACGCAAGAGAGAA--	28nc1
1	...TTCTGGG.A--C...A.C.CG..-GC..AA.T.G.TT..T.A.CTC.GC.G..T..AAG...A.A..TA	28nc2
1	.G..TT.AT.G...CC...A.....GA.CTA.AC...T..T.A.TA..GC..C.T..AA..A.A...AA	28nc3
1	...TT.AT.G...CC...A.....GA.CTA.AC...T..T.AWT.A..GC..C.T..AA..A.A...AA	28nc4
70	ATAGT-----TAGTAATAAATTAGAAAG-----TTAAA--TATT--AGAAAAGT-CA	28nc1
72	G...G--AAAATTACC..AC...TGAC..T.CAAGTTTACC..GCT...CTC.C...C.T.T	28nc2
75	....GGCAAAAGAATG...C...GAGG.GGG.GGGGAC...TT..CCTTC--T.TTC.T.T	28nc3
74	....GGCAAAAGAATG...C...GAGG.GGG.GGGGAC...TT...CTTC--T.TGC.T.C	28nc4
112	TATGTTTTTCATTGTGAT-ACTCAACTA---AAAGTAGTAT-----AAATGT-----	28nc1
136	.G...C...T..CTCT--T.CA.-G..A.-GTAC.-CT..CT.CACTACTGTAG.G...GTTTATCAATGC	28nc2
139	A..A..C..T--ACT..-----T...A..GCAC..CTC.A.GCTTCCA-GG-A...A.GT-TTCTAATAT	28nc3
138	C.A.....TCYC.CT...T..G...T..AC.ACAG..G...A...CCTCACGG-A...CT.ATCTTCAAATAT	28nc4
159	--TACTTATTAAATAAT-TTTACGTTAGTATATTAATTTCCCTTACAAAAGCCACTAGTATTTATA	28nc1
205	TT.GT.....--C.C...A..A..G.....TT.....CT.....A.....	28nc2
202	TT..T.....CC...CC...TA..A.....T.....AT.T...A.G.....	28nc3
211	TT..T.....CC...C...TA..A.....T.....AT.....	28nc4
222	CTAAAAGC-TATACTTTGGCTTGTTAATTTTGTATTTTACTACTGTAAATTACTT-TCACTGTT---TCT	28nc1
269	..T.G.ATA...T.C.A.....GC...A..C.CC...T.....T...A...A...TA	28nc2
268	..T..TATA...T.C.....C...C.C.CC...T.....T...A...A...TA	28nc3
276	.C...ATA...T.C.A...CT...CT.C.C.C.C...T.T.....T.G...A..AGG.TA	28nc4
-35		
292	GGTGTAAT 28nc1	(SEQ ID NO: 30)
338	.....- 28nc2	(SEQ ID NO: 31)
339	.....- 28nc3	(SEQ ID NO: 32)
339	TA-A...-W 28nc4	(SEQ ID NO: 33)
RBS		

Fig. 10

**Fig. 11**

111.9 100 80 60 40 20 0

BY CLASS SUBCLASS

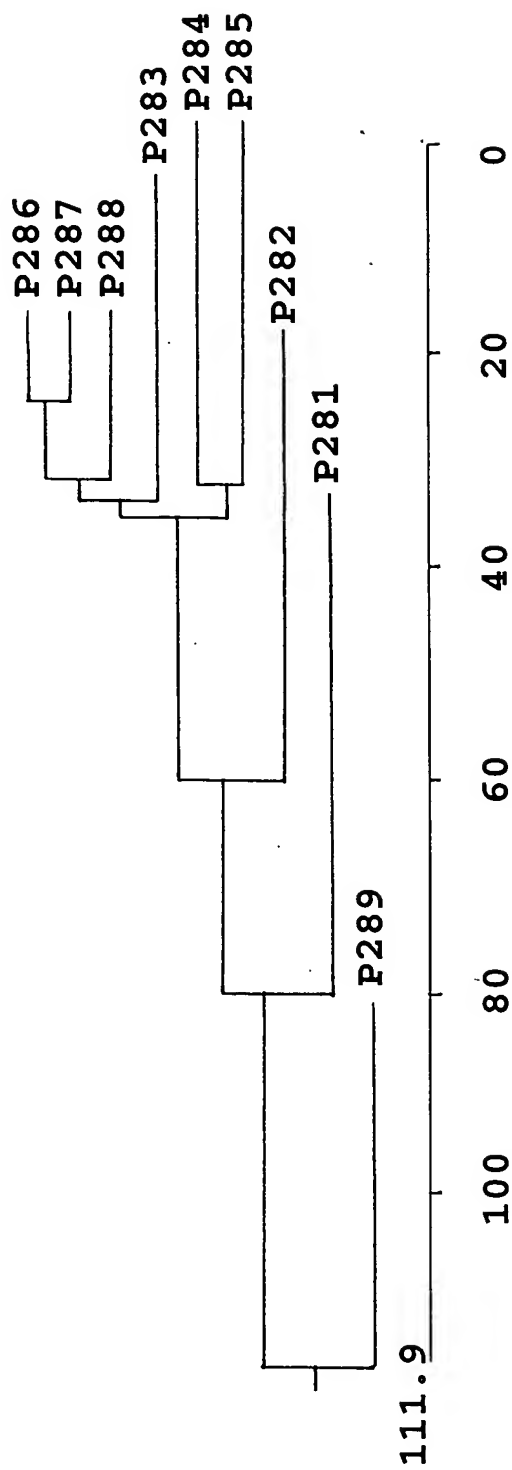


Fig. 12



**Fig. 13**

ATGAATTATAAGAAAATTCTAGTAAGAAGCGCGTTAATCTCATTAAATGTCAATCTTACCA 60  
M N Y K K I L V R S A L I S L M S I L P  
TATCAGTCTTTTGCAGATCCTGTAGGTTCAAGAACTAATGATAACAAAGAAGGCTTCTAC 120  
Y Q S F A D P V G S R T N D N K E G F Y  
ATTAGTGCAAAGTACAATCCAAGTATATCACACTTTAGAAAATTCTCTGCTGAAGAACT 180  
I S A K Y N P S I S H F R K F S A E E T  
CCTATTAATGGAACAAATTCTCTCACTAAAAAAGTTTTTCGGACTAAAGAAAGATGGTGAT 240  
P I N G T N S L T K K V F G L K K D G D  
ATAACAAAAAAGACGATTTTACAAGAGTAGCTCCAGGCATTGATTTTCAAATAACTTA 300  
I T K K D D F T R V A P G I D F Q N N L  
ATATCAGGATTTTCAGGAAGTATTGGTTACTCTATGGACGGACCAAGAATAGAACTTGAA 360  
I S G F S G S I G Y S M D G P R I E L E  
GCTGCATATCAACAATTTAATCCAAAAACACCGATAACAATGATACTGATAATGGTGAA 420  
A A Y Q Q F N P K N T D N N D T D N G E  
TACTATAAACATTTTGCATTATCTCGTAAAGATGCAATGGAAGATCAGCAATATGTAGTA 480  
Y Y K H F A L S R K D A M E D Q Q Y V V  
CTTAAAAATGACGGCATAACTTTTATGTCATTGATGGTTAATACTTGCTATGACATTACA 540  
L K N D G I T F M S L M V N T C Y D I T  
GCTGAAGGAGTATCTTTCGTACCATATGCATGTGCAGGTATAGGAGCAGATCTTATCACT 600  
A E G V S F V P Y A C A G I G A D L I T  
ATTTTTAAAGACCTCAATCTAAAATTTGCTTACCAAGGAAAAATAGGTATTAGTTACCCT 660  
I F K D L N L K F A Y Q G K I G I S Y P  
ATCACACCAGAAGTCTCTGCATTTTATTGGTGGATACTACCATGGCGTTATTGGTAATAAA 720  
I T P E V S A F I G G Y Y H G V I G N K  
TTTGAGAAGATACCTGTAATAACTCCTGTAGTATTAAATGATGCTCCTCAAACCACATCT 780  
F E K I P V I T P V V L N D A P Q T T S  
GCTTCAGTAACTCTTGACGTTGGATACTTTGGCGGAGAAATTGGAATGAGGTTACCTTC 840  
A S V T L D V G Y F G G E I G M R F T F  
(SEQ ID No. 41)  
(SEQ ID No. 42)

**Fig. 14**

ATGAACTGTAAAAAATTCTTATAACAACTACATTGGGTATCACTAACAAATTCTTTTACCT 60  
M N C K K I L I T T T L V S L T I L L P  
GGCATATCTTTCTCCAAACCAATACATGAAAACAATACTACAGGAAACTTTTACATTATT 120  
G I S F S K P I H E N N T T G N F Y I I  
GGAAAATATGTACCAAGTATTTTACATTTTGGGAACTTTTCAGCTAAAGAAGAAAAAAC 180  
G K Y V P S I S H F G N F S A K E E K N  
ACAACAACCTGGAATTTTTTGGATTAAAAGAATCATGGACTGGTGGTATCATCCTTGATAAA 240  
T T T G I F G L K E S W T G G I I L D K  
GAACATGCAGCTTTTAATATCCCAAATTATTCATTTAAATATGAAAATAATCCATTTTTTA 300  
E H A A F N I P N Y S F K Y E N N P F L  
GGATTTGCAGGGGTAATTGGCTATTCAATAGGTAGTCCAAGAATAGAATTTGAAGTATCA 360  
G F A G V I G Y S I G S P R I E F E V S  
TACGAGACATTCGATGTACAAAATCCAGGAGATAAGTTTAAACAATGATGCACATAAGTAT 420  
Y E T F D V Q N P G D K F N N D A H K Y  
TGTGCTTTTATCCAATGATTCCAGTAAAACAATGAAAAGTGGTAAATTCGTTTTTCTCAA 480  
C A L S N D S S K T M K S G K F V F L K  
AATGAAGGATTAAGTGACATATCACTCATGTAAATGTATGTTATGATATAATAAACAAA 540  
N E G L S D I S L M L N V C Y D I I N K  
AGAATGCCTTTTTTCACCTTACATATGTGCAGGCATTGGTACTGACTTAATATTCATGTTT 600  
R M P F S P Y I C A G I G T D L I F M F  
GACGCTATAAACCATAAAGCTGCTTATCAAGGAAAATTAGGTTTTAATTATCCAATAAGC 660  
D A I N H K A A Y Q G K L G F N Y P I S  
CCAGAAGCTAACATTTCTATGGGTGTGCACTTTCACAAAGTAACAAACAACGAGTTTAGA 720  
P E A N I S M G V H F H K V T N N E F R  
GTTCTGTTCTATTAAGTCTGGAGGACTCGCTCCAGATAATCTATTTGCAATAGTAAAG 780  
V P V L L T A G G L A P D N L F A I V K  
TTGAGTATATGTCATTTTGGGTTAGAATTGGGTACAGGGTCAGTTTT (SEQ ID No. 43) 828  
L S I C H F G L E F G Y R V S F (SEQ ID NO. 44)

**Fig. 15**

ATGAATTACAAAAGATTTGTTGTAGGTGTTACGCTGAGTACATTTGTTTTTTTCTTATCT 60  
 M N Y K R F V V G V T L S T F V F F L S  
  
 GATGGTGCTTTTTCTGATGCAAATTTTCTGAAGGGAGGAGAGGACTTTATATAGGTAGT 120  
 D G A F S D A N F S E G R R G L Y I G S  
  
 CAGTATAAAGTTGGTATTCCCAATTTTAGTAATTTTTCAGCTGAAGAAACAATTCCTGGT 180  
 Q Y K V G I P N F S N F S A E E T I P G  
  
 ATTACAAAAAAGATTTTTCGTTAGGTCTTGATAAGTCTGAGATAAATACTCACAGCAAT 240  
 I T K K I F A L G L D K S E I N T H S N  
  
 TTTACACGATCATATGACCCTACTTATGCAAGCAGTTTTGCAGGGTTTAGTGGTATCATT 300  
 F T R S Y D P T Y A S S F A G F S G I I  
  
 GGATATTATGTTAATGACTTTAGGGTAGAATTTGAAGGTTCTTATGAGAATTTTGAACCT 360  
 G Y Y V N D F R V E F E G S Y E N F E P  
  
 GAAAGACAATGGTACCCTGAGAATAGCCAAAGCTACAAATTTTTTGCTTTGTCTCGAAAT 420  
 E R Q W Y P E N S Q S Y K F F A L S R N  
  
 GCTACAAATAGTGATAATAAGTTTATAGTACTAGAGAATAACGGCGTTGTTGACAAGTCT 480  
 A T N S D N K F I V L E N N G V V D K S  
  
 CTTAATGTAAATGTTTGTATGATATTGCTAGTGGTAGTATTCCTTTAGCACCTTATATG 540  
 L N V N V C Y D I A S G S I P L A P Y M  
  
 TGTGCTGGTGGTGGTGCAGATTATATAAAGTTTTTAGGTATATCATTGCCTAAGTTTTCT 600  
 C A G V G A D Y I K F L G I S L P K F S  
  
 TATCAAGTTAAGTTTGGTGTCAACTACCCTCTAAATGTTAATACTATGTTGTTTGGTGGG 660  
 Y Q V K F G V N Y P L N V N T M L F G G  
  
 GGTTATTACCATAAGGTTGTAGGTGATAGGCATGAGAGAGTAGAAATAGCTTACCATCCT 720  
 G Y Y H K V V G D R H E R V E I A Y H P  
  
 ACTGCATTATCTGACGTTCTAGAACTACTTCAGCTTCTGCTACTTTAAATACTGATTAT 780  
 T A L S D V P R T T S A S A T L N T D Y  
  
 TTTGGTTGGGAGATTGGATTTAGATTTGCGCTA (SEQ ID No. 45) 813  
 F G W E I G F R F A L (SEQ ID No. 46)

Fig. 16